

Remarks

Claims 1-23 and 28-31 are currently pending.

Amendments to the Claims

Claim 1 has been amended to specify that the polymer molecule is a biomolecule.

Support for this amendment may be found throughout the specification, including at page 1, line 4 and page 5, line 18.

Claim 18 has been amended to remove the language “such as” in order to clearly point out and distinctly claim the appropriate subject matter.

New claims 28-31 have been added to clearly point out and distinctly claim the subject matter which the Applicants regard as their invention. New claim 28 specifies that the polymer molecule may be a co-polymer. Support for this claim may be found in the specification at page 5, line 21. New claims 29-31 have been added to specify that the polymer molecule of claim 1 may comprise DNA or RNA; a protein; or an antibody or antigen-antibody, respectively. Support for claims 29-31 may be found in original claim 18.

No new matter has been introduced by these amendments.

Rejections Under 35 U.S.C. § 103

Claims 1-23 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,840,862 to Bensimon et al. (hereinafter “Bensimon”) in view of Shu, et al., “Extremely Long Dendronized Polymers: Synthesis, Quantification of Structure Perfection, Individualization, and SFM Manipulation,” *Angew. Chem.*, 113, **2001**, 4802-4805 (hereinafter “Shu”).

Claim 1 has been amended to recite the arrangement of a polymer molecule that is a biomolecule.

Instead of disclosing the adjustment of biomolecules, such as DNA, Shu discloses the manipulation of giant dendronized aromatic organic molecules which possess extremely high stiffness and mechanical strength. Specifically, Shu “report[s] the divergent synthesis of an extremely high molar mass, surface functionalized, G4 dendronized polystyrene (PS), its individualization and SFM visualization on graphite, and its manipulation with the SFM tip.” Shu, p. 4666 (emphasis added). Shu is able to use the SFM tip to move the dendronized polystyrene because its chemical structure is capable of withstanding a very high mechanical load. Shu even explicitly discloses that “[f]or resolution reasons, scanning force microscopy (SFM) is useful for larger objects (a few nm in diameter) than (*sic.*) scanning tunneling microscopy (STM, a few Å). Shu, p. 4666 (emphasis added).

Due to the molecular weight disparity between biomolecules and Shu’s dendronized polystyrene, Shu does not teach or suggest that such a force can be applied to biomolecules like DNA or RNA without damaging or breaking the strands. Based on the teachings of Shu, a person of skill in the art would not expect to use an SFM tip to move a biomolecule with any reasonable expectation of success.

Therefore, the Examiner has failed to establish a *prima facie* case of obviousness because “[t]he prior art can be modified or combined to reject claims as *prima facie* obvious as long as there is a reasonable expectation of success.” M.P.E.P. § 2143.02. A person of skill in the art would not expect to manipulate biomolecules by adopting a forceful technique designed to move a dendronized polymer with an “extremely high molar mass” with any reasonable degree of success.

The shortcomings of Shu are not overcome by Bensimon. As discussed in the previous response and correctly noted by the Examiner, “Bensimon fails to explicitly disclose a method in which at least part of the absorbed (*sic.*) molecule is dislocated across said surface layer relative to said support via an external force.” Office Action, p. 3. Bensimon teaches that “[m]acromolecules such as nucleic acid strands are aligned, adhered and stretched on a support surface by passing the strands through a meniscus of a solvent containing the strands.” Abstract. The technique of Bensimon is commonly called “molecular combing.”

A person of ordinary skill in the art would not combine a method that uses the gentle force of a passing meniscus to similarly align multiple nucleic acid strands with a method designed for manipulating an “extremely” heavy dendronized polymer in order to devise a method for arranging adsorbed biomolecules with any reasonable expectation of success. The present specification even notes that “[a]n attempt to move a ‘molecularly combed’ molecule or its part, for example with assistance of AFM-tip (AFM—‘Atomic Force Microscopy’), causes just cutting of polymer chain.” Page 2, lines 31-33.

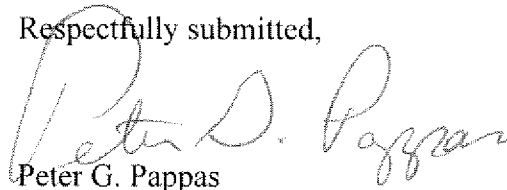
Conclusion

Therefore, the Applicants respectfully submit that the method of claim 1, which is limited to biomolecules, is non-obvious over Bensimon and Shu, whether considered alone or in combination. Accordingly, dependent claims 2-23 and 28-31, all of which depend upon claim 1, are also non-obvious over the cited prior art.

The foregoing is submitted as a complete response to the office action mailed May 1, 2009. If there are any questions that can be resolved by a telephone conference, the Examiner is invited to contact the undersigned attorney at 404-853-8064.

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AMENDMENT AND
RESPONSE TO OFFICE ACTION

Respectfully submitted,



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